

REMARKS

On pages 3 to 8 of the Office Action, claims 2-23 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Yamazaki (US 4,588,610) in view of various combinations of Motoyama et al. (JP 2002-075876), Zhang et al. ("Low Temperature...Excimer Lamp"), Ray et al. ("Diamond Like...Deposition"), Horioka et al. (US 4,595,601), and Aoyama (JP 04-146620). Applicant respectfully traverses these rejections for at least the following reasons.

The Office Action acknowledges that Yamazaki does not teach applying a negative bias voltage to the substrate, and relies upon Motoyama et al. for allegedly teaching such a feature in order to increase the generation rate of film formation and improve the quality of the film. In addition, the Office Action relies upon Zhang et al. for allegedly evidencing that the Xe lamp of Motoyama et al. emits photon energy within the claimed range. Accordingly, the Office Action concludes that it would have been obvious to modify the process of Yamazaki by the teachings of Motoyama et al., as supported by Zhang et al., in order to establish a *prima facie* case of obviousness with regard to at least independent claims 21-23. Applicant respectfully disagrees.

First, Applicant respectfully asserts that independent claims 21-23 each recites the specific feature of "irradiating an ultraviolet ray having a photon energy of 3 to 10 eV to a surface

of the substrate from a light source," (emphasis added). In addition, independent claim 21 recites the feature of "applying a negative bias voltage to the substrate and *accelerating the emitted electrons,"* (emphasis added). Similarly, independent claim 23 recites the specific features of "applying a negative bias voltage to the substrate..., and *accelerating the emitted electrons,"* (emphasis added).

In direct contrast to Applicant's claimed invention, none of Yamazaki, Motoyama et al., Zhang et al., Ray et al., Horioka et al., and Aoyama, in any combination, teaches or suggests accelerating electrons emitted from a surface of a negatively biased substrate due to irradiating the substrate surface with photon energy of 3 to 10 eV. Here, Motoyama et al. is explicitly directed towards negatively biasing a substrate in order to attract photolyzed positive ions by electrostatic attraction, and is completely silent with regard to accelerating electrons from the substrate surface. In addition, Applicant respectfully asserts that Motoyama et al. is explicitly directed towards photodecomposition of raw material using UV light, without any teaching or suggestion of emitting electrons using photon energy of 3 to 10 eV on the substrate surface. Accordingly, Applicant respectfully asserts that the combined teachings of Yamazaki and Motoyama et al., as well as any of Zhang et al., Ray et al., Horioka et al., and Aoyama, fail to establish a *prima facie* case

of obviousness with regard to the combination of features recited by at least independent claims 21-23.

Second, due to the well known principle of UV absorption by gas molecules, Applicant respectfully asserts that Motoyama et al. and Zhang et al. fail to teach or suggest irradiating a surface of the substrate 2 with a photon energy of 3 to 10 eV. Here, Motoyama et al. merely discloses, at paragraph [0019] of the machine-translation provided with the Office Action, that an excimer lamp is used without any evidentiary support that the process disclosed by Motoyama et al. provides for irradiating the surface of the substrate 2 with a photon energy, as claimed. In addition, since Motoyama et al. is explicitly directed towards using the excimer lamp in the process of photodecomposition of the raw material, and the photodecomposition process increases the UV absorption by the gas molecules, Applicant respectfully asserts that Motoyama et al. fails to teach or suggest that the surface of the substrate 2 receives a photon energy of 3 to 10 eV and/or that electrons are emitted by the substrate 2 and accelerated by the negative biasing of the substrate 2, as required by independent claims 21-23.

Third, Applicant respectfully asserts that the presently claimed invention is not concerned with photodecomposition of gas molecules since the UV absorption phenomenon will actually reduce the effects of the disclosed invention. Specifically, Applicant respectfully asserts that irradiation of the substrate surface is

to emit electrons based upon the photoelectric effect, and that negatively-biasing the substrate is used to accelerate these emitted electrons. As a result of the present invention, collisions of the accelerated/emitted electrons with the process gas increases electron impact dissociation of the process gas and improves deposition onto the substrate. Thus, Applicant respectfully asserts that the claimed invention and the combined operational principles of Yamazaki and Motoyama et al. are completely different, as is reflected by the combination of features recited by at least independent claims 21-23.

In addition, Applicant respectfully asserts that none of Zhang et al., Ray et al., Horioka et al., and Aoyama, in any combination, can remedy the deficiencies of Yamazaki and Motoyama et al., as detailed above. Specifically, Applicant respectfully asserts that none of Zhang et al., Ray et al., Horioka et al., and Aoyama, whether taken individually or combined, teaches or suggests accelerating electrons from a substrate surface using either the negative biasing of the substrate or irradiating an ultraviolet ray having a photon energy of 3 to 10 eV to the substrate surface. Accordingly, none of Zhang et al., Ray et al., Horioka et al., and Aoyama, in any combination, can remedy the deficiencies of Yamazaki and Motoyama et al.

For at least the reasons set forth above, Applicant respectfully asserts that the Office Action fails to establish a *prima facie* case of obviousness with regard to at least

independent claims 21-23, and respectfully requests that the rejections of claims 2-23 under 35 U.S.C. §103(a) be withdrawn.

This Response is believed to be fully responsive and to place the application in condition for allowance. Entry of the amendment, and an early and favorable action on the merits is earnestly requested. Applicant respectfully requests that a timely Notice of Allowance be issued in this application.

Should the Examiner believe that any matters need to be resolved in the present application, the Examiner is respectfully requested to contact Applicant's undersigned representative at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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